

BOLDT (H.J.)

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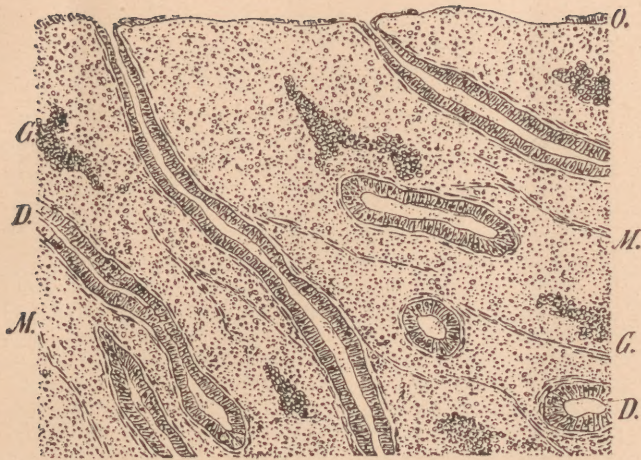
Contribution to the Literature Concerning the Normal
Mucous Membrane of the Uterus.

By H. J. BOLDT, M.D.,
NEW YORK.



PLATE I.

FIG. 1.



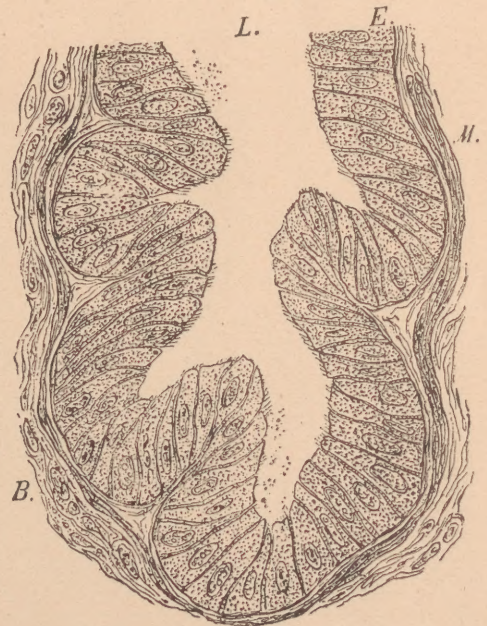
Mucous membrane of the uterus during menstruation $\times 400$.
O. Surface of mucous membrane; *M. M.* Muscle processes; *G. G.* Blood-vessels; *D. D.* Utricular glands in longitudinal oblique and transverse sections.

FIG. 2.



Cervical gland of a virgin uterus $\times 400$.
A. A. Adenoid or lymph tissue; *M.* Layer of smooth muscle; *Z. Z.* Muscle bundles in lymphatic tissue;
E Epithelial cells; *L.* Lumen of the glands.

FIG. 3.

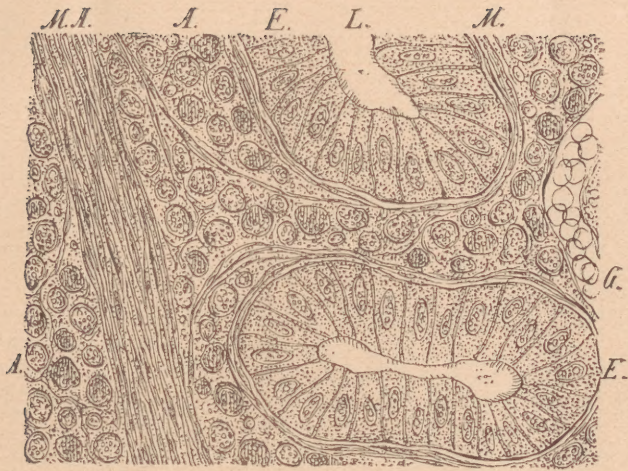


Cervical gland from the uterus of a multipara $\times 400$.
B. Connective tissue; *M.* Layer of smooth muscle;
E Epithelial cells; *L.* Lumen of the tube.



PLATE II.

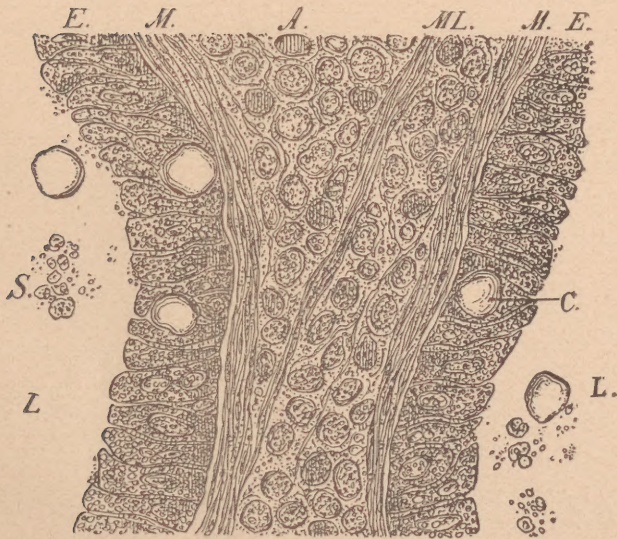
FIG. 1.



Utricular glands from the fundus uteri of a virgin $\times 400$.

M.A. Muscle bundles in lymphatic tissue; *E.E.* Epithelial cells;
M. Gland muscles associated with muscular processes in lymphatic tissue;
G. Capillary bloodvessels; *L.* Lumen of utricular glands.

FIG. 2.



Utricular glands from the body of the uterus of a multipara $\times 400$.

A. Adenoid or lymph tissue; *M.L.* Muscular process in lymphatic tissue;
E.E. Coarsely granular epithelia; *M.A.* Gland-muscle processes; *C.* Colloid bodies;
S. Mucous corpuscles; *L.* Lumen of utricular glands.

ANNOUNCEMENT.

Beginning with the issue for March, 1890, the ANNALS OF GYNÆCOLOGY, formerly published in Boston, was enlarged and improved, and a Department of Pædiatry added, under the editorship of Dr. LOUIS STARR, of Philadelphia, formerly Professor of Diseases of Children at the University of Pennsylvania, author of "Hygiene of the Nursery," associate editor of "Pepper's System of Medicine," Physician to the Children's Hospital, and author of "Diseases of the Digestive Organs."

The journal is now published by University of Pennsylvania Press, Philadelphia, under the name,

Annals of Gynæcology and Pædiatry.

Dr. E. W. CUSHING, of Boston, who has recently become Surgeon of the Woman's Charity Club Hospital for Women, continues to edit the Department of Gynæcology.

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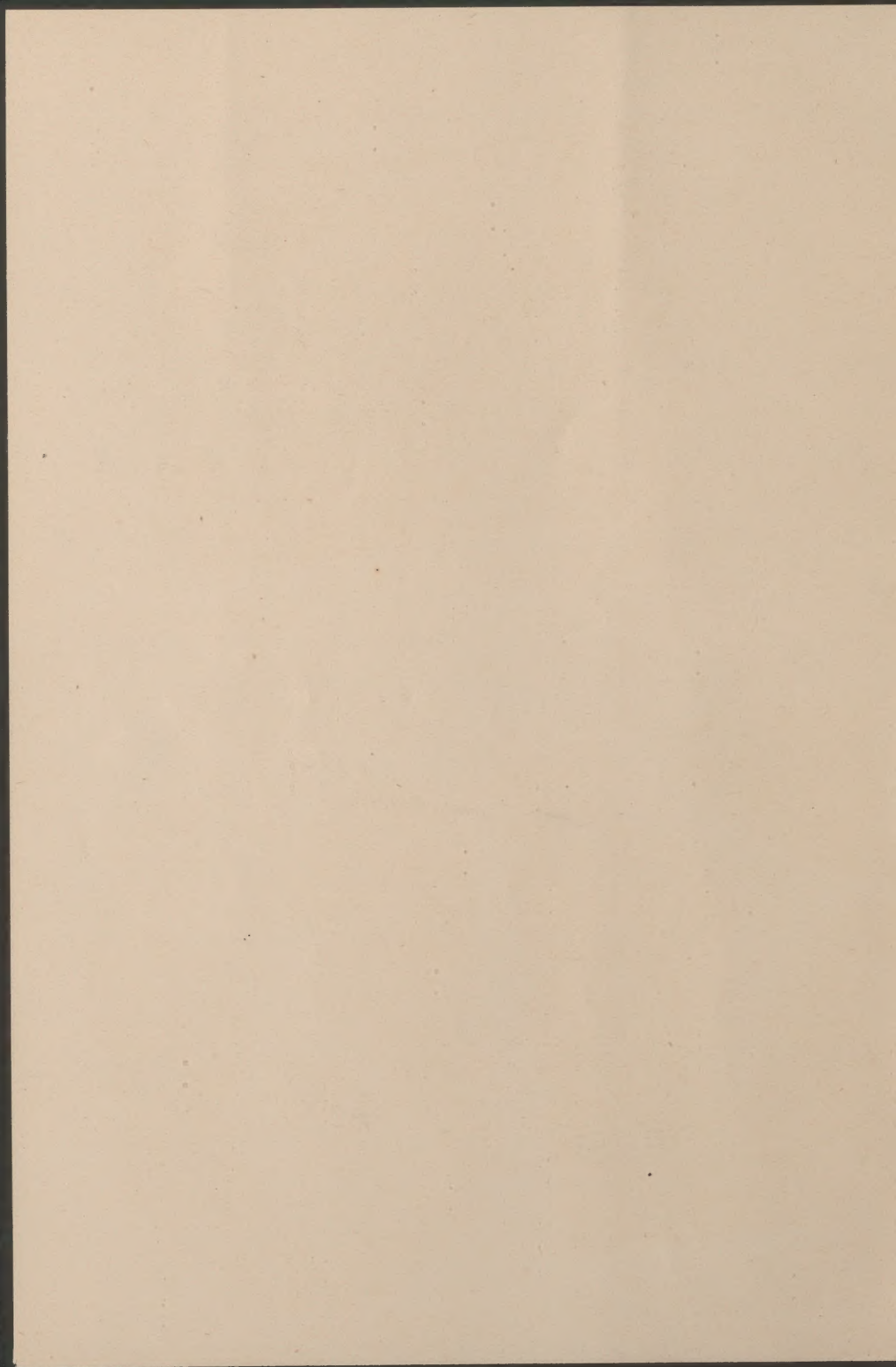
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Contribution to the Literature Concerning the Normal Mucous Membrane of the Uterus.

BY H. J. BOLDT, M. D.

NEW YORK.

[With Plates I and II.]

IN studying the uterine mucous membrane during menstruation, from specimens prepared in Canada balsam, I found that all the utricular glands were surrounded with rod or spindle-shaped forms, whether seen in longitudinal, in transverse or in oblique sections. At the same time I observed that the stroma of the menstrual mucous membrane, where it exceeded 3 to 5 millimeters in thickness, was also occupied by the outlines of the same formations. The rod and spindle-shaped forms took a deep stain with carmine. I could trace these forms from the base of the glands, where they formed a moderately conspicuous layer, up to the surface—not in an uninterrupted, but in an interrupted layer, which diminished so very gradually toward the surface of the mucous membrane that it finally became only a single layer of spindle-shaped bodies. (See Plate I, Fig. 1.)

With very high powers of the microscope, there remained no doubt that one had under observation rod and spindle-shaped nuclei of smooth muscular fibres, around which the protoplasm of the smooth, muscular, spindle-shaped cells was obscured, in consequence of the treatment with Canada balsam. That one was actually dealing with such formations was

evident by a comparison with the muscular layer of the uterus itself. It appeared from this that at the boundary zone between muscle and mucous membrane the former sends out moderately wide processes into the latter, so that the tubes forming the glands seemed to be surrounded by wide muscle processes, between which only moderately small portions of adenoid or lymphatic tissue remained visible. Between contiguous glands, relatively to their terminations in their cul-de-sacs, I could discover only muscular processes and no lymphatic tissue. The nearer one approached to the surface, the thinner were the glands accompanying the muscular processes, concerning the character of which as muscle fibre there could be no doubt, because I could demonstrate them as uninterrupted processes of the muscular structure. In the intestine we have great numbers of tubular glands—the well-known crypts of Lieberkühn—which, as was shown long ago, are accompanied and surrounded by smooth muscular fibres, which belong entirely to the *muscular mucosa*, sending their processes inwardly into the intestinal structure. A similar condition in the uterus has heretofore not been recognized. I looked in vain in the German text-books on histology for such a description, while

MUCOUS MEMBRANE OF THE UTERUS.

among histologists it is considered that the cul-de-sac endings of the glands are embedded in muscular tissue or are accompanied by such tissue, while the further relations of the muscular processes have nowhere called forth any opinion. Barnes makes the following observation: "Between the glands are found irregular processes of muscular fibre combined with connective-tissue cells of varying size and form. The entire layer, which is composed of glands and the intermediate muscle and connective-tissue elements, was described by Ercolani as the *muscle-gland layer* of the uterus." I was unable to find in Ercolani's work the quotation made by Barnes ("Midwifery," last edition). I cannot conclude, therefore, whether Ercolani, in addition to the muscular bundles which penetrate the adenoid tissue of the mucosa, observed also those which accompany the glands themselves. I have further investigated this subject upon the uteri of girls and women of different ages—virgins and multiparæ—the specimens being hardened in chromic acid, stained with carmine and mounted with glycerine, this method of preparation being preferred because organs hardened in chromic acid solutions enable one to study their structure somewhat better than those which are hardened in alcohol alone. The mounting in Canada balsam permits one to study the nuclear formations of specimens stained with carmine with great satisfaction, but leaves the tender protoplasm formations obscure, and therefore a glycerine preparation is to be preferred.

Vertical sections through the wall of the cervix uteri of a virgin show the following (see Plate I, Fig. 2): The

mucous membrane is richly provided with adenoid or lymphatic tissue, and traversed by numerous small muscular bundles. The glands are tubular formations, with many irregularities of outline, and covered with a single layer of columnar epithelium. The calibre is small and of quite moderate diameter. Between the epithelium and the contiguous layers of tissue no so-called structureless membrane can be seen. The boundary layer, on the contrary, shows smooth muscular fibres, whose layers are of varying width, and in some places are entirely wanting. When the latter is the case, the boundary zone is formed entirely of lymphatic tissue. For the demonstration of the muscular processes those glands are especially suitable in which the epithelium is partly detached and partly absent. The muscular formation of the boundary layer can be so demonstrated with high powers that one can see the spindle formation of the individual muscle fibres, while the rod formation of the nuclei may not be apparent. Not infrequently are there in the muscular layer, especially where it has considerable (relative) width, formations resembling lymph corpuscles, which are surrounded by branching processes. The mucous membrane of the cervix uteri of a multipara has a basis of fibrillary connective tissue interspersed with a small quantity of lymphatic tissue. Many of the connective-tissue bundles are extensively infiltrated with a ground substance of collagen, which makes them strongly refractive of light. The gland ducts are wider and more branching than is the case in the virgin uterus. The calibre of the walls varies as to its diameter, and their boundary layer

between the epithelium and the surrounding tissue consists of a moderately well-defined, structureless membrane and a delicate fibrillary connective tissue, whose irregular elevations are covered with columnar epithelium. (See Plate I, Fig. 3.)

Between the basal layer and the boundary layer of connective tissue with its coarse fibre there is a layer of smooth muscular fibres of varying width. Each gland has an accompanying layer of muscular fibre composed of two muscle spindles, though they may number four or five, and in many places this muscular layer may be entirely wanting. Very seldom will we find a section of a gland which has no muscle layer in its surroundings. Where wide muscle bundles occur, they occasionally appear to be suddenly interrupted, while the cutting of the muscle bundle shows transverse and oblique sections of the muscle spindles. From these facts, and from the varying width of the muscle layer and the occasional complete absence of the same, we may draw the conclusion that the muscle layer which accompanies the glands is not continuous, but is pierced in many places and surrounds the glands like a basket in a kind of woven formation.

The mucous membrane from the fundus of a virgin uterus is composed of moderately wide muscle bundles which run within the adenoid or lymphatic tissue. These bundles are often combined with muscular processes which appear to be woven around the tube-like glands. (See Plate II, Fig. 1.)

These webs of muscle surrounding the glands are never very wide, and are composed of only two or three muscle spindles. Muscle fibres may

be entirely absent, and then the boundary zone is made up of adenoid tissue, while a so-called structureless membrane is only in rare cases definable.

The utricular glands from the corpus uteri of a multipara show the attendant web of muscular tissue much more clearly defined than the same structure in a virgin uterus. (See Plate II, Fig. 2.)

In the specimen which was studied there was evidently an existing chronic endometritis, for the epithelia were coarsely granular and irregular, and contained numerous colloid bodies. Of the mammalian animals I have studied the unimpregnated uterus of a sheep with reference to these anatomical conditions, and found the muscle layers accompanying the glands with satisfactory definiteness. As the result of my studies I concluded that in the mucous membrane of the uterus there are certain anatomical conditions which have not been described heretofore. Not only is the adenoid or lymphatic tissue interwoven with muscular tissue, but the utricular glands of the cervix and of the body of the uterus are associated with a layer of smooth muscular fibres arranged in a web-like manner. These muscular processes have a relation to the muscle bundles of the uterine wall as well as to those which are associated with the lymphatic tissue of the mucosa. These gland-muscles are developed most significantly at the border zone between mucous membrane and muscularis, and become less pronounced near the surface of the mucous membrane. They accompany the glands as far as the openings of the latter in the cavity of the womb.

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